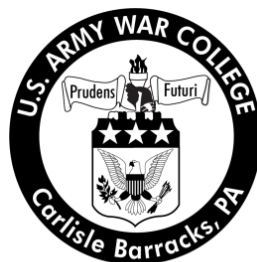


## Managing Requirements for Acquisition Program Affordability

by

Colonel James O. Winbush, Jr.  
United States Army



United States Army War College  
Class of 2012

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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. <b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b>					
1. REPORT DATE (DD-MM-YYYY) 14-04-2012		2. REPORT TYPE Civilian Research Paper		3. DATES COVERED (From - To) 24-07-2011 to 11-04-2012	
4. TITLE AND SUBTITLE Managing Requirements for Acquisition Program Affordability				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) COL James O. Winbush, Jr.				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  Senior Service College Fellowship Program The University of Texas at Austin 1 University Station, G1000 Austin, TX 78712				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)  U.S. Army War College 122 Forbes Ave. Carlisle, PA 17013				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT DISTRIBUTION A: UNLIMITED					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT <p>Over the last ten years, the Army has spent billions of research and development dollars on weapon systems that were ultimately cancelled. A few of the high profile programs include the Future Combat Systems, Crusader howitzer, and the Comanche helicopter. Since 2004, the Army has incurred approximately \$3B dollars per year in research and development for cancelled programs. While there are many factors that led to these program cancellations, ambitious performance requirements that demanded maturation of high risk technologies played a significant part in making the programs unaffordable and untimely. Additionally, the current process continues to foster a climate of optimizing each individual weapon's performance requirement, thus driving up cost and sub-optimizing the systems as a whole.</p> <p>Given the upcoming budget constraints of FY12 and beyond, the Army cannot afford to repeat the mistakes of the last 10 years. It is vital that the Army effectively and efficiently delivers new capabilities to the force to ensure Combatant Commanders can execute a full range of operations in an uncertain operational environment.</p>					
15. SUBJECT TERMS  Cost Growth, Performance Requirements, Acquisition Programs, Systems Engineering					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED	c. THIS PAGE UNCLASSIFIED			LTG(R) Joe Yakovac
			UNLIMITED	30	19b. TELEPHONE NUMBER (include area code) 512-232-4566



USAWC CIVILIAN RESEARCH PROJECT

**Managing Requirements for Acquisition Program Affordability**

by

Colonel James O. Winbush, Jr.  
United States Army

Dr. Douglas R. Dierking  
Project Adviser

This CRP is submitted in partial fulfillment of the requirements of the Senior Service College fellowship.

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U.S. Army War College  
CARLISLE BARRACKS, PENNSYLVANIA 17013



## **ABSTRACT**

AUTHOR: Colonel James O. Winbush, Jr.  
TITLE: Managing Requirements for Acquisition Program Affordability  
FORMAT: Civilian Research Project  
DATE: 14 April 2012      WORD COUNT: 5,171      PAGES:30  
KEY TERMS: Cost Growth, Performance Requirements, Acquisition Programs,  
Systems Engineering  
CLASSIFICATION: Unclassified

Over the last ten years, the Army has spent billions of research and development dollars on weapon systems that were ultimately cancelled. While there are many factors that led to these program cancellations, ambitious performance requirements that demanded maturation of high risk technologies played a significant part in making the programs unaffordable and untimely. The Army must improve its requirements generation process to ensure newly initiated acquisition programs have feasible operational requirements aimed at achieving incremental blocks of combat capability. This research paper analyzes the impact of ambitious requirements on the selection of immature technologies for program development, and it provides a statistical analysis the related cost growth implications. This paper concludes that the Army must implement professional military and civilian education specifically intended to drive a cultural change in requirements development and establish new mechanisms for controlling requirements change in acquisition programs.



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## **Managing Requirements for Acquisition Program Affordability**

### Introduction

In May 2009, Congress passed the Weapon Systems Acquisition Reform Act of 2009, which was hailed as an important step in limiting cost growth of acquisition programs.<sup>1</sup> The overarching goal was to strengthen oversight and accountability to ensure that taxpayer dollars are efficiently used to buy quality weapons within the budgeted cost. This was part of the continuing effort by Congress and The Department of Defense (DoD) to pursue acquisition reform initiatives aimed at reducing weapon systems cost growth. As a construct, cost growth is linked to the concept of value. In general, the Army is willing to pay a predetermined price for the development of a capability that has a perceived military utility. If the predetermined price is exceeded, the capability loses its value and overtime decreases in military utility.

Former Secretary of Defense Dr. William Perry attempted to put DoD on a path to manage the unsustainable cost growth of new weapons by issuing a policy memorandum titled “Specifications & Standards – A New Way of Doing Business,” in June 1994.<sup>2</sup> His objective was to buy weapon systems at a lower cost and higher quality by leveraging commercial technology. He also directed program managers (PMs) and acquisition decision makers to challenge capability requirements that drove unnecessary costs. Dr. Perry recognized that many of the problems facing military acquisition programs did not begin with contract performance specifications but were rooted in the requirements determination phase of the acquisition program.<sup>3</sup> Over seventeen years later, the Army is still challenged to contain the escalating costs of acquisition programs. However, the Army is now forced to also react to an

unpredictable future operational environment in conjunction with severe budget constraints caused by a national economic crisis.

Since 2004, the Army has spent billions of dollars for programs that were eventually cancelled. A few of the high profile cancelled programs include the Future Combat Systems, Crusader howitzer, and the Comanche helicopter. While there are many factors that led to these program cancellations, ambitious requirements that demanded maturation of high risk technologies played a significant part in the cancellation decisions.<sup>4</sup> As the Nation takes necessary measures to improve its economic situation, reduced defense budgets will force the Army to eliminate programs that experience trouble meeting cost, schedule, and performance objectives. Managing complex projects is a challenging task, and one key prerequisite for program success is that it starts with a clear set of achievable and affordable requirements.<sup>5</sup> In this context, achievable implies that technologies needed for system development are matured to a technology readiness level (TRL) of seven at the official initiation of the program. A TRL 7 means that the weapons system exists in a prototype form, and that it has been demonstrated functional capability in a relevant operational environment. This essentially means that the technologies are not high risk for full scale system development and fielding. Another key prerequisite is that all stakeholders must be aligned and committed to building an affordable system.

### Scope and Limitations

This research focuses on performance requirements development for Army acquisition programs. In particular, this research examines how ambitious performance

requirements, a critical part of the requirements management process, impacts cost growth of major defense acquisition systems. The central theory for this research is that cost growth is a positive function of the system performance requirements and can be expressed as  $Cost\ Growth = f^+(Performance\ Requirements)$ . As the system performance requirements become more challenging, the program is more likely to experience cost growth. This research is driven by two questions: 1) Do ambitious performance requirements increase the probability of acquisition program experiencing cost growth? 2) Can the Army implement measures to control ambitious performance requirements?

In the context of this research, cost growth is defined as the difference between the actual program cost, or latest approved program cost estimate, and the initial cost estimate at program initiation. This is to distinguish it from a cost overrun, which is defined as an unexpected cost increase on a particular system contract. If difference is a positive number, the program is denoted as experiencing cost growth. A negative number indicates the program is on target to meet its cost objectives. In many cases, cost growth is calculated as a percentage using the following formula:  $Cost\ Growth = (Actual\ Cost - Initial\ Estimate) / Initial\ estimate$ . Ambitious performance requirements are defined as initial operational performance objectives that are not feasibly possible given the state of technology maturity at program initiation. Technology readiness levels are used as a proxy to measure this construct. As defined in this study, a TRL 6 or less is considered as an immature technology.

This research does not attempt to develop an equation to predict cost growth as a function of any variable. Several studies have confirmed that cost growth can be

predicted by weapons commodity (combat vehicles, aircraft, space systems, etc.) over time.<sup>6</sup> There is no need for additional research to confirm this. Such prediction equations can be used to adjust initial cost estimates if the Army desires to do that. However, Congress and other key leaders have asked the Army to control and reduce cost growth- not to better predict it. To that end, this research is focused on determining if this can be accomplished through controlling performance requirements.

This research is limited to data available in the Department of Defense Selective Acquisition Reports (SARs) and previous studies in this research area. While this research does look at other cost growth factors, it does not try to determine which factor or factors have the greatest impact on cost growth. Since performance requirements are the foundation of an acquisition program, this study emphasizes that establishment of feasible performance requirements is crucial to creating a stable acquisition program baseline and limiting cost growth.

### Importance of the Research

The Army's budget will be reduced as a part of the Nation's overall strategy to deal with the current economic crisis. DoD currently has direction to reduce planned spending by \$487 billion over the next ten years, and the Army will likely absorb a significant amount of the budget cuts. Budget reductions will largely be accomplished by reducing the following: combat operations in Afghanistan, R&D programs, procurement, and military personnel funding. Once the Army concludes combat operations in Afghanistan, it will still need to make significant investments in resetting and recapitalizing current equipment in order to respond to future contingency

operations. This further limits how much can and will be invested in developing new weapons for future operations.

Figure 1 (below) shows an analysis of DoD spending using data from U.S. Government Spending website, which was adjusted to 2005 constant dollars.<sup>7</sup> The data covers defense spending from 1917 (World War I) through 2012. The graph shows that historically U. S. defense spending declines following the conclusion of major conflicts. The moving average trend line suggests that spending for the current war efforts has peaked and is starting to decline towards a level representative of the U.S. during periods of peace. The linear trend line suggests that DoD should prepare for a possible funding decline to approximately \$350 billion per year. Comparison of the Army's budget to DoD's budget from 2001 through 2012 reveals that the Army receives approximately 25 percent of the Department's total budget. Thus, it is reasonable to anticipate that Army can plan on receiving 25 percent of future DoD budgets, which should drive planning for investments in acquisition programs, personnel end strength, reset of the current force, and sustainment of the force over time.

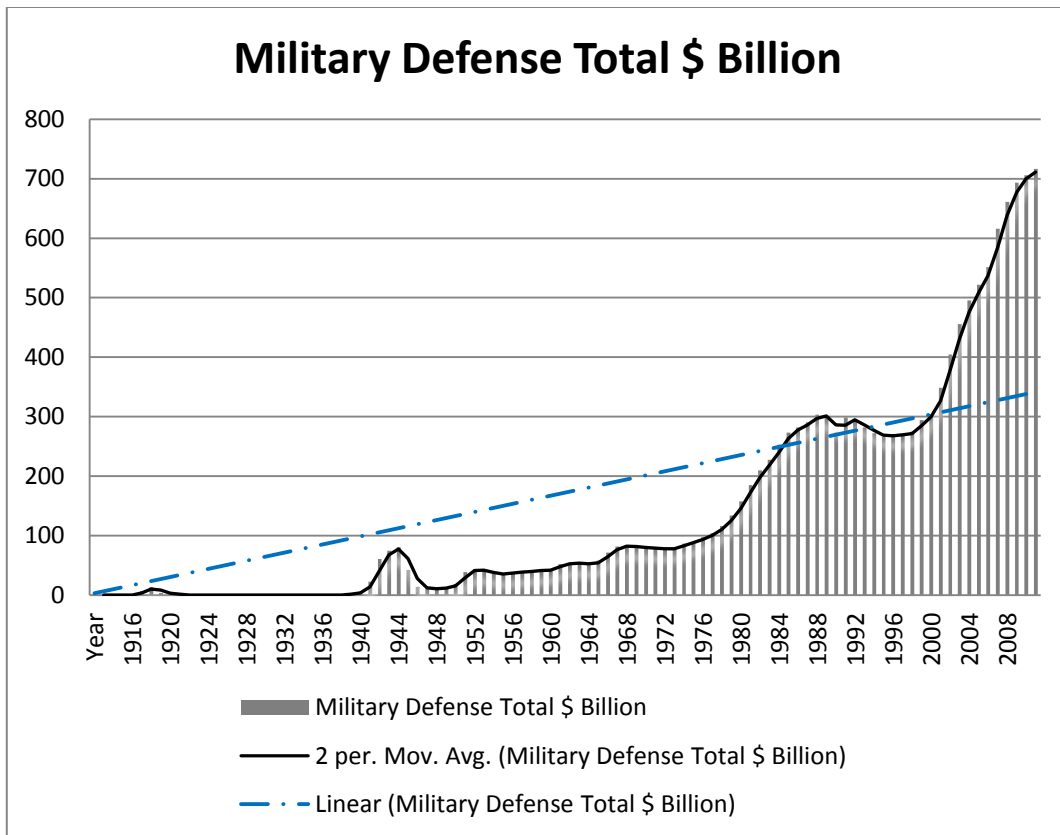


Figure 1. Yearly Defense Spending

The convergence of these necessary expenditures with anticipated budgetary constraints mandate that the Army pursues less costly acquisition programs. It requires the Army to limit weapon systems performance requirements to what is absolutely needed to mitigate the identified capability gaps and nothing more. Figure 2 is an adaptation of the traditional cost, schedule, and performance (CSP) triangle discussed in DoD acquisition training.<sup>8</sup> Conceptually it illustrates that cost increases as result of any performance and schedule increases. Perhaps more importantly, it illustrates that any schedule or performance increases causes an increase in the area of the triangle. The objective is to hold cost and schedule constant by trading off performance requirements. When cost and schedule are not held constant, it fundamentally means that the Army must reallocate resources to cover the cost growth as the DoD budget

allocation remains relatively fixed over time. Thus, failure to make appropriate tradeoffs in weapon systems performance requirements increases opportunity costs, other forgone modernization efforts, and degrades the total Army combat capability overtime.

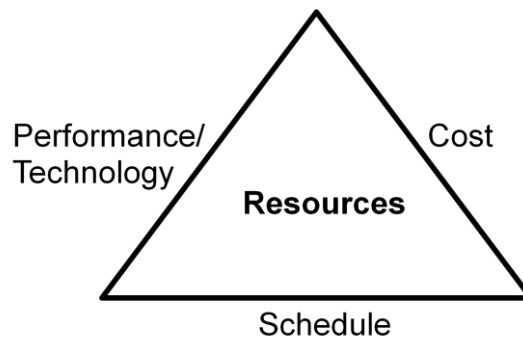


Figure 2. CSP Triangle

### Review of the Related Literature

In their January 2011 final report to the Secretary of the Army, the Honorable Gilbert F. Decker and General (R) Louis C. Wagner, Jr. pointed out that the Army terminated 22 programs from 1990 through 2010.<sup>9</sup> These terminations represent a significant loss in anticipated combat capability and consumed a large percentage of the Army's research and development budget. One of the major reasons they cite for Army programs entering an "acquisition death spiral" of increasing cost is that system performance requirements are developed based on what the warfighter says he needs or desires, without enough consideration of the technical risk involved or available funding to achieve it. This phenomenon is exacerbated by incorporating immature technologies into the program in order to achieve promised capability advancement or accelerate the program schedule.<sup>10</sup>

Joachim Hofbauer et al. (2011) conducted a study of 104 major defense acquisition programs, where they analyzed the effects of initial cost estimates, quantity

and schedule changes, and engineering problems on cost growth.<sup>11</sup> This study identifies variances in the estimating process as the primary driver for cost growth.<sup>12</sup> While the study demonstrates that low cost estimates are correlated with cost growth, extending that correlation to making it a cause is a circular argument. By definition, underestimating the cost of developing a weapon system means the program will be underfunded and appear to increase in cost. However, a low initial cost estimate does not cause a true system cost growth. The initial cost estimate is derived from the system performance requirements, which are logically more plausible as a source of cost growth. If the higher cost estimate had been provided for budgetary decision making, it may have prevented starting the program due concerns of its affordability. The real problem with low cost estimates is that they influence decision makers to pursue unaffordable systems instead of affordable alternatives. Hofbauer et al also argue that extending a program schedule increases the cost.<sup>13</sup> This is true because at a minimum any extension consumes more resources and causes additional personnel costs over the time added to the schedule. To be more specific, adding time to a project demands a modification to the system contract and additional funding for the work done in the extension period. The more important fact to consider is that Army leaders make a conscientious decision to extend the program schedule, thus causing the cost growth. Alternative options include accepting the system that can be achieved without the extension or terminating the program.

Obaid Younossi et al. (2007) conducted a study of DoD weapon systems cost growth to answer the following two research questions: 1) What is the cost growth of DoD weapon systems? 2) What has been the trend of cost growth over the past three

decades?<sup>14</sup> For the first question, they found that on average DoD acquisition programs experience an average of 46% development cost growth.<sup>15</sup> Second, and perhaps more importantly, they found that despite acquisition reform efforts the trend of the average development cost growth for weapon systems over the past three plus decades has remained high and is not improving.<sup>16</sup> This suggests that acquisition reform efforts have at best mitigated potential increases of cost growth overtime.

Harry M. Calcutt, Jr. (1993) conducted a historical study of DoD weapons cost growth, where he looked at the effects of requirements, cost estimating, program management, contracting, and budgetary actions on acquisition programs.<sup>17</sup> Calcutt's research asserts that poor initial requirements definition and poor performance versus cost trade-offs during development are major contributors to cost growth.<sup>18</sup> His research also found evidence that programs using high risk technologies or executing high risk schedules were more likely to exhibit cost growth.<sup>19</sup>

The U.S. Army Safeguard System Office (1972) publish a study on cost growth and put forth a theory that budgetary costs and the associated cost estimates become detached from the performance requirements from which they were derived.<sup>20</sup> Basically the theory proposes that as a program moves towards initiation the estimate will reflect what the Service has in the budget for the weapon system, which will match what the contractor states as the cost of the development effort. The performance requirements, the actual cost driver, become decoupled from the cost estimation and budget efforts. However, the performance of the system will ultimately drive the final cost and will be realized as cost growth after development begins.<sup>21</sup> It is important to point out here that decoupling cost estimates and budgets from performance requirements make those

numbers absolutely meaningless for use by decision makers. Any decisions made are based on systematically flawed information.

### Traveling a Familiar Road

The Army was faced with similar challenges with the military draw downs following Vietnam and the Cold War. As operations in Iraq and Afghanistan conclude, the Army will transition to resetting the force and modernizing for the future conflicts. To do this, the Army must exercise an extraordinary degree of self discipline in defining and executing its acquisition programs. The good news is that the Army has demonstrated this kind of discipline and resolve before, which resulted in the Army's "Big Five": the Abrams tank, the Bradley fighting vehicle, the Blackhawk utility helicopter, the Apache attack helicopter, and the Patriot air defense system.<sup>22</sup> Perhaps the greatest key to the Big Five's success was the commitment of senior Army leadership to achieve stability in the Army's requirements and resources for these programs.<sup>23</sup> Senior Army leaders were intimately involved in defining the minimal set of necessary performance requirements for these programs and committed to trading capability to achieve affordability goals. The Big Five demonstrated a practical approach to prioritizing funding to meet a constrained set of balanced capability needs.

This intimate involvement by key senior Army leaders was not unique at the time. The Big Five was initiated prior to the Goldwater-Nichols Department of Defense Reorganization Act of 1986, which placed acquisition responsibilities with the Secretary of the Army.<sup>24</sup> Acquisition responsibility is executed by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology). This perhaps has had an unintended

effect of senior Army uniformed leaders not engaging more in the acquisition process. However, the uniformed leaders are responsible for identifying operational capability gaps and the associated capability requirements documents. As demonstrated by the Big Five, senior uniformed leadership can make a major positive impact on controlling performance requirements and attenuating bureaucratic behavior of the individual Army branches (Infantry, Armor, Aviation, etc.).

### Analysis of the Problem

DoD has been diligent in studying the causes for cost growth and proactive in reform efforts to control costs. In fact, there have been nearly 130 studies on acquisition reform since the end of World War II.<sup>25</sup> These studies, have attempted to identify the root causes of acquisition program cost growth.<sup>26</sup> Some common problems identified in these studies include: ambitious requirements, requirements creep, over optimism of the development effort, cost estimating errors, and unforeseen technical issues.<sup>27</sup> Despite all these previous studies, recent Congressional hearings and acquisition review reports continue to highlight the same basic issues in current acquisition programs. The House Armed Services Committee's report on the fiscal year 2007 (FY2007) Defense Authorization Act expressed concern that the entire acquisition process was broken including: requirements generation, acquisition management, contracting, and financial management.<sup>28</sup> The report also indicated that the committee felt the Services were attempting to place "all necessary and imaginable" capabilities in their acquisition programs, thus driving unnecessary cost.<sup>29</sup> Additionally, the committee

recognized that the Services lacked sufficient training programs for requirements personnel in comparison to training programs for other acquisition professionals.<sup>30</sup>

This asserts that performance requirements are indeed a source of program cost growth, which directly relates to the first research question. To test the hypothesis that ambitious performance requirements were contributing to cost growth, the researcher analyzed data from the 40 programs in the March 2011 U.S. General Accountability Office's (GAO) report to congressional committees.<sup>31</sup> The report represents a subset of programs in the SAR database. Although this was a snap shot in time, the 2010 report was consistent with the 2011 report which suggests that the data representative of current major defense programs. Because DoD does not directly measure ambitious performance requirements, immature technology was chosen as a proxy for the analysis. The report contained an initial technology readiness assessment of 32 major acquisition programs and corresponding data on cost growth for those programs. For the purpose of analysis, technology readiness was given a high or low level based on GAOs assessment. A two way table was constructed to compare the technology assessment with the initial cost estimate and the latest cost estimate (Table 1). If the latest cost estimate exceeded the initial cost estimate, the program was categorized as experiencing cost growth. A Chi-Squared test was used to test the hypothesis that there is no relationship between immature technology at program initiation and program cost growth. Based on the Chi-Squared analysis results, where the P-Value equaled 0.026, immature technology was determined to be related to cost growth. Thus, it is concluded that ambitious performance requirements is related to cost growth.

Condition	High Tech Readiness	Low Tech Readiness
Cost Growth	4	21
No Cost Growth	4	3

**Table 1**

The Army must stand ready to defeat any enemy, at anytime around the globe. Therefore, it is understandable that combat developers demand the highest levels of capabilities for combat systems. However, each combat developer views his or her system in isolation and not necessarily with regard to how program costs impact the Army's capability development opportunities in other areas. In contrast, senior Army leadership is challenged to balance portfolios of capabilities, within budget constraints, to meet United States Code Title 10 responsibilities for providing combatant commanders equipped, trained, and ready forces. This causes a natural struggle to balance acquisition programs, including associated requirements and system effectiveness, with available resources.

There is no single issue that can be "fixed" to ensure that Army acquisition programs perform under cost and on schedule; however, requirements development sets the conditions for the entire acquisition program. Failing to define achievable and affordable program requirements up-front may not always result in a cancellation, but it burdens the PM with difficult program objectives.<sup>32</sup> The former Assistant Secretary of the Army (Acquisition, Logistics and Technology), Malcolm Ross O'Neill, highlighted unrealistic requirements as a key area for improvement at the National Defense Industrial Association Executive Seminar in April 2010.<sup>33</sup> More recently, LTG William Phillips, the Military Deputy to the Assistant Secretary of the Army (Acquisition, Logistics

and Technology), stated that the Army was going to stop chasing unrealistic requirements and requirements that do not make sense to save both money and time.<sup>34</sup> Unlike achievable requirements defined above, unrealistic or ambitious requirements usually result in PMs relying on high risk, immature technologies in order to achieve program objectives. This puts the program at high risk of being under funded, influences the PM and contractors to take irresponsible shortcuts, and increases the likelihood of significant program difficulties.<sup>35</sup> When the program starts to experience trouble, decision makers are likely to make requirements modifications that ultimately increases technical risk and increases cost.<sup>36</sup> The end result is that Army acquisition and combat developments leaders get trapped in an escalating commitment spiral and perhaps feel forced to continue investing in programs that are significantly over cost and behind schedule.<sup>37</sup>

Requirements development cannot be simply thought of as a business management process. It is an engineering process that requires sound business management skills. Requirements development must be undertaken from a “systems approach” to objectively define the critical operational requirements needed to fulfill a capability gap.<sup>38</sup> The systems approach provides a repeatable process to determine which requirements are needed to meet the overall system performance goals and seeks to determine how requirement changes impact the total system. Prioritizing requirements helps exclude nonessential requirements and assists PMs to maximize using the trade space by focusing on key characteristics contributing the most to needed operational capabilities.<sup>39</sup>

Another issue is that Army requirements development still remains a relatively stove-piped process, where Training and Doctrine Command (TRADOC) schools develop requirements for capability gaps in their functional areas. Thus, the combined arms force may not fully understand the capability gap, what is causing the gap to exist, or its full impact on the joint force mission. This drives the combat developer to try to maximize the requirements for his or her system in an attempt to overcome the capability gap as an independent entity. This makes the requirements process susceptible to “gold plating” and can drive unnecessary technology focused requirements. For example, one of the main reasons the Army Chief of Staff cited for terminating the Comanche program (March 2004) was unachievable requirements.<sup>40</sup> In this case, the Army spent billions developing a stealth helicopter capable of evading radars but was still vulnerable to heat-seeking missile threats. From an operational standpoint, the Comanche required defensive characteristics that were balanced and optimized to provide the best holistic solution to all known threats. At a minimum, the expensive low observable (stealth technology) requirement was in conflict with heat seeking missile defense requirement. We must change the cultural behaviors that lead to these types of requirements issues.

### Conclusions and Recommendations

The focus of this research was to answer two fundamental questions: 1) Do ambitious performance requirements increase the probability of acquisition program experiencing cost growth? 2) Can the Army implement measures to control ambitious performance requirements? Based on the results from the Chi-Squared test, the

answer to question 1 is yes. Ambitious performance requirements are likely to influence the acquisition program team to pursue immature, high risk technologies in order to achieve the performance objectives. The program is then likely to start execution with immature critical technologies and in turn run into technical difficulties. This usually results in the program exceeding its planned budget profile and schedule, which are realized as cost growth.

The answer to the second question is also yes. As demonstrated with the Big Five, the Army is capable of developing and executing acquisition programs with a minimum set of priority requirements. Given the national economic outlook and the expected decline in DoD budget, the Army must fundamentally change its culture and approach to capability development. Just as senior civilian and military leaders have led the Army through major changes in the past, they must lead change in the capability development process. Strong leadership and engagement from the highest levels of the Army are required to break the cycle of committing to bad acquisition requirements decisions and escalating the commitment of resources to failing programs.

The Army must embrace evolutionary acquisition and refrain from pursuing challenging requirements with unproven technologies. The foundation of evolutionary acquisition is time-phased operational requirements that define an achievable increment of capability for each phase.<sup>41</sup> Requirements must be balanced with available resources and technologies to mitigate capability gaps and remain stable throughout the program increment. Some capability gaps will not have immediately affordable materiel solutions. Hence, the Army must continue robust investments in science and technology (S&T) objectives to ensure proper TRLs are reached prior to committing

technologies to acquisition programs. Evolutionary acquisition requires collaboration among the key stakeholders using concurrent engineering processes - not stove-piped sequential processes. This means that combat developers, PMs, and S&T personnel must all work together to define achievable requirements and affordable programs.<sup>42</sup>

The Army needs to make an investment in training the entire force on the basics of capability development. Although the Army Logistics University and the Defense Acquisition University offer some courses, these are not sufficient to develop a cadre of combat development professionals on par with acquisition professionals. This lack of training was pointed out in the 2007 House Armed Services Committee's report.<sup>43</sup> Initial training should occur in the Captain's Career Course and should provide a foundation of how the capabilities development and acquisition processes works. This training must cover how to state operational requirements to fill capability gaps without specifying technology solutions. Furthermore, the training must focus on changing the culture of writing requirements. It is not rational to set threshold requirements that have a low probability of achievement. The training must address this inconsistency and provide tools for all acquisition stakeholders to avoid groupthink. This is necessary because although there is agreement that the Army should continuously address the necessity and affordability of performance requirements, evidence shows that even at the institutional level the Army continues to fail to make rational decisions to achieve affordable acquisition programs.<sup>44</sup>

While it is not expected that the entire force will be experts in requirements development, this training is also relevant to support expeditionary contracting efforts for deployed forces. The success of the expeditionary contracting mission depends on the

operational forces being able to state requirements sufficiently to support the contracting process.

For military and civilian personnel working in TRADOC, the Army must develop them into professional combat developers that understand the true impact of requirements on system cost and provide skill certification levels similar to acquisition career fields. Being a combat developer requires more skills than being able to determine a valid capability gap and writing a requirements document. The combat developer should be able to understand the cost and technical impacts of threshold values of a requirement. If the acquisition system is pushed to deliver a requirement with a low probability of achievement, the capability gap will likely still exist but the requirement and program funding will eventually vanish.

The Army also needs to consider reorganization of its combat developments force structure to support a system of systems performance requirements generation process. In order to gain synergy and more control, it is recommended that the Army consolidates combat developments assets in a field operating agency reporting to the Department of the Army Deputy Chief of Staff for Operations, G3.<sup>45</sup> The current combat developments organization, based on Army branches, encourages rivalry among competing programs and requires a tremendous overhead caused by duplication of functions at proponent schools.<sup>46</sup> This action would reduce the overall overhead while providing a robust staff to perform the necessary systems engineering functions required to adequately support performance versus cost tradeoffs. and develop the concepts, overarching architectures, supporting analytics, and a prioritized work effort required to support Army transformation

The Army also needs a better mechanism for requirements change control. If there needs to be a change in a key performance parameter (KPP) because a threshold value cannot be achieved, then this change needs to go back to senior Army leadership for action. Changes to KPPs are major decisions and should not be made in vacuums or at low levels within the Army, as it likely impacts Combatant Commanders. If the cost of achieving the KPP has minimal return on the investment for the gain in operational capability, it is rational to change the requirement to accept the achieved performance.<sup>47</sup> If the requirements change does not affect a KPP and will result in maintaining cost and schedule objectives, the PM should be empowered to make the change with notification to the Army stakeholders. The capability would then be deferred to the next increment of development, which is consistent with the evolutionary acquisition approach. This gives the PM the appropriate level of authority and responsibility to maintain cost, schedule, and performance objectives.

The above recommendations do not assure that all acquisition programs will successfully deliver capabilities within cost and on schedule. However, with the exception of Acquisition Category I D programs, it is a manageable set of acquisition policy changes that can be readily implemented at Army Acquisition Executive level.<sup>48</sup> Past studies on this problem seem to indicate that without policy and organizational behavioral change, we will continue to execute acquisition programs the same way while still expecting better results. Again, this is irrational thinking and is not likely to occur. The Army is capable of executing acquisition programs better and new studies are not likely to provide a “silver bullet” to fix the known problems. As a final thought, Army leaders cannot write new policy for acquisition reform and wait for positive results

to occur. In order to bring about change in requirements development and program execution, senior Army leaders must design and implement a “persuasion campaign” that is delivered to the grass roots level of the entire Army.<sup>49</sup>

## **Endnotes**

<sup>1</sup> David J. Berteau, Joachim Hofbauer, and Stephanie Sanok, *Implementation of the Weapon Systems Acquisition Reform Act of 2009*, (Center for Strategic & International Studies, Washington DC: May 26, 2010), 3.

<sup>2</sup> U.S. Secretary of Defense William Perry, "Acquisition Reform – A Mandate for Change," memorandum for Secretaries of the Military Departments, Washington, DC, February 9, 1994.

<sup>3</sup> U.S. Secretary of Defense William Perry, "Specifications & Standards – A New Way of Doing Business," memorandum for Secretaries of the Military Departments, Washington, DC, June 29, 1994.

<sup>4</sup> Office of the Secretary of the Army, *Army Strong: Equipped, Trained and Ready Final Report of the 2010 Army Acquisition Review* (Washington, DC: U.S. Department of the Army, January 2011), 31-33.

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<sup>13</sup> Ibid., 7.

<sup>14</sup> Obaid Younossi, et al., *Is Weapon System Cost Growth Increasing?, A Quantitative Assessment of Completed and Ongoing Programs*, (study for the United States Air Force, RAND Corporation, Arlington, Virginia, 2007), 15.

<sup>15</sup> Ibid., 17.

<sup>16</sup> Ibid., 45.

<sup>17</sup> Harry M. Calcutt, Jr., *Cost Growth in DoD Major Programs: A Historical Perspective* (Fort Lesley J. McNair, Washington, DC: Industrial College of the Armed Forces, April, 1993, 15-16.

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<sup>24</sup> *The Goldwater-Nichols Department of Defense Reorganization Act of 1986*, Public Law 99-433, 99<sup>th</sup> Congress, (October 1, 1986), 46.

<sup>25</sup> U.S. Congressional Research Service, *Defense Acquisitions: How DOD Acquires Weapon Systems and Recent Efforts to Reform the Process* (Washington, DC: U.S. Congressional Research Service, April 2010), 13.

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<sup>27</sup> Ibid.

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<sup>30</sup> Ibid.

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<sup>33</sup> The Honorable Malcolm O'Neill, "Army Acquisition Challenges and Opportunities," briefing presented at the National Defense Industrial Association Executive Seminar, Washington, DC, April 20, 2010.

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<sup>41</sup> U.S. Department of Army, *Army Acquisition Policy*, Army Regulation 70-1, (Washington DC: U.S. Department of the Army, July 22, 2011), 2.

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<sup>43</sup> U.S. Congress, House Armed Services Committee Report 109-452, *Report of the Committee on Armed Services*, 351.

<sup>44</sup> David M. Cutler, "Why Don't People and Institutions Do What They Know They Should?," [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1888580](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1888580) (accessed January 26, 2012).

<sup>45</sup> Harold J. Greene, *The Army Materiel Requirements Generation Process: A Process in Need of Change*, (Carlisle Barracks, PA: U.S. Army War College, April 7, 2003), 15-16.

<sup>46</sup> Ibid.

<sup>47</sup> The Navy made changes to the threshold requirements for gross takeoff weight, acceleration, and range for the F-18 without reducing overall combat effectiveness. Jay D. Bottelsohn, "Requirements and Cost Stability: A Case Study of the F/A-18 Hornet Program," [http://www.dau.mil/pubscats/PubsCats/AR%20Journal/arj60/Bottelsoon\\_ARJ60.pdf](http://www.dau.mil/pubscats/PubsCats/AR%20Journal/arj60/Bottelsoon_ARJ60.pdf) (accessed January 26, 2012).

<sup>48</sup> The Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) is the Defense Acquisition Executive (DAE) and serves as Milestone Decision Authority (MDA) for Acquisition Category I Defense (ACAT) ID programs. ACAT ID programs are estimated to require eventual expenditure for research, development, test, and evaluation of more than \$365 million or procurement of more than \$2.19 billion (FY 2000 constant dollars). U.S. Department of Defense, *Defense Acquisition Guidebook*, (Washington DC: Department of Defense, July 29, 2011), 15.

<sup>49</sup> David A. Garvin and Michael A. Roberto, "Change Through Persuasion", *Harvard Business Review*, February 2005, 2.

